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ABSTRACT

This document, which reflects Mississippi's statutory requirement that instructional programs be based on core curricula and performance-based assessment, contains outlines of the instructional units required in local instructional management plans and daily lesson plans for welding I and II. Presented first are a program description and course outlines. Section I contains curriculum frameworks for both courses, and section II contains outlines of the instructional units required in each course. Units in welding I are as follows: occupational orientation and safety, drawing and welding symbol interpretation, oxyfuel gas cutting and welding, and shielded metal arc welding (SMAW). Units in welding II include the following: occupational orientation and safety review, SMAW (continued), gas metal arc welding short arc, gas tungsten arc welding, arc cutting principles and practices, drawing and welding symbol interpretation (continued), and job seeking skills. Each unit includes suggested time on tasks, competencies and objectives, teaching strategies, assessment strategies, and resources. Recommended tools and equipment are listed in section III. Appended are lists of related academic topics and workplace skills for the 21st century and student competency profiles for both courses. (YLB)

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ED 397 325

Mississippi Curriculum Framework for Welding

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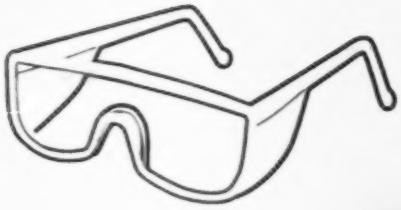

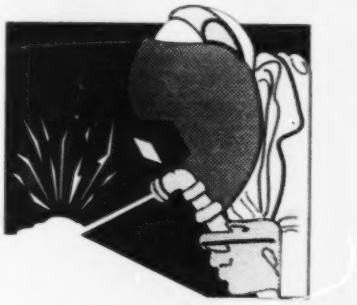

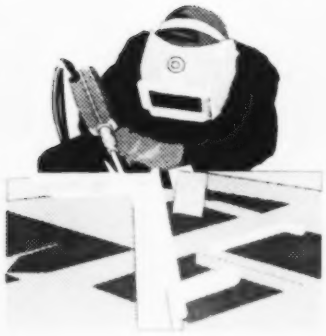

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CURRICULUM FRAMEWORK

FOR

WELDING

(PROGRAM CIP: 48.0508 - WELDER/WELDING TECHNOLOGIST)

SECONDARY PROGRAMS

1996

July 30, 1996

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FOREWORD

The courses in this document reflect the following statutory requirements as found in Section 37-3-49, Mississippi Code of 1972, as amended:

> The State Department of Education shall provide an instructional program and establish guidelines and procedures for managing such programs in the public schools as part of the State Program of Educational Accountability and Assessment of Performance. . .
>
> The department shall provide that such program or guidelines . . . are enforced through the performance-based accreditation system.
>
> The local school board must adopt the objectives that will form the core curriculum that will be systematically delivered throughout the district.
>
> Standards for student performance must be established for each core objective in the local program and those standards establish the district's definition of mastery for each objective.
>
> There shall be an annual review of student performance in the instructional program against locally established standards.

Each secondary vocational-technical course consists of a series of instructional units which focus on a common theme. All units have been written using a common format which includes the following components:

- Unit Number and Title
- Suggested Time on Task - The number of days of instruction that should be required to teach the competencies and objectives of the unit. For secondary occupational programs, a "day" represents a two-period block of instruction.
- Competencies and Suggested Objectives
  - A **Competency** represents a general concept of performance that students are expected to master as a requirement for satisfactorily completing a unit. Students will be expected to master all competencies in the curriculum framework in order to satisfactorily complete the course.
  - The **Suggested Objectives** represent the enabling and supporting knowledge and performances that will indicate mastery of the competency.
- Suggested Teaching Strategies - This section of each unit indicates strategies that can be used to enable students to master each suggested objective. Teachers should feel free to modify or enhance these suggestions based on needs of their students and resources available in order to provide optimum learning experiences for their students.

- Suggested Assessment Strategies - This section indicates strategies that can be used to measure student mastery. Examples of suggested strategies could include classroom discussions, laboratory exercises, and student assignments. Again, teachers should feel free to modify or enhance these suggested assessment strategies based on local needs and resources.
- Suggested Resources - This section indicates some of the primary instructional resources that may be used to teach the competencies and suggested objectives. Again, these resources are suggested and the list may be modified or enhanced based on needs and abilities of students and on available resources.

The following guidelines were used in developing the curriculum framework in this document and should be considered in developing local instructional management plans and daily lesson plans:

- The content of the courses in this document reflects approximately 75 percent of the time allocated to each course. For a one-year course, this means that the content of the existing units of instruction should represent approximately 135 days of instruction. The remaining 25 percent of each course should be developed at the local district level and may reflect:
  - Additional units of instruction within the course related to topics not found in the state framework.
  - Activities which develop a higher level of mastery on the existing competencies and suggested objectives.
  - Activities and instruction related to new technologies and concepts that were not prevalent at the time the current framework was developed/revised.
  - Activities which implement components of the Mississippi Tech Prep Initiative, including integration of academic and vocational-technical skills and coursework, school-to-career transition activities, and articulation of secondary and postsecondary vocational-technical programs.
  - Individualized learning activities, including work site learning activities, to better prepare individuals in the courses for their chosen occupational area.
- Sequencing of the units of instruction within a course is left to the discretion of the local district. Naturally, foundation units related to topics such as safety, tool and equipment usage, and other fundamental skills should be taught first. Other units related to specific skill areas in the course, however, may be sequenced to take advantage of seasonal and climatic conditions, resources located outside of the school, and other factors.

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PROGRAM DESCRIPTION

WELDING

(Program CIP: 48.0508 - Welder/Welding Technologist)

The Welding curriculum is designed to prepare the student for entry level employment in the field of welding. Students in Welding I complete study in occupational orientation, safety, drawing and welding symbol interpretation, oxyfuel gas cutting and welding, and shielded metal arc welding (SMAW). Students in Welding II complete study in occupational orientation and safety review, shielded metal arc welding (SMAW) (continued), gas metal arc welding (GMAW) short arc, gas tungsten arc welding (GTAW), arc cutting principles and practices, drawing and welding symbol interpretation (continued), and job seeking skills.

National Standards Developed by American Welding Society (AWS)

The welding competencies required in this curriculum were developed to coincide with the Specification for Qualification and Certification for Entry Level Welders (AWS QC 10-95), developed by the American Welding Society and funded by the U.S. Department of Education under Grant V.244 B 3006. The contributions of this resource are hereby acknowledged.

The American Welding Society provides a series of reference materials to support this curriculum. For additional information on AWS Educational membership contact: American Welding Society, AWS Education Department, 550 N.W. LeJeune Road, Miami, FL 33161. Phone: (800) 443-WELD. FAX: (305) 443-7559.

COURSE OUTLINE

WELDING I

Unit No.	Unit Name	Number of Days
Unit 1	Occupational Orientation and Safety	10
Unit 2	Drawing and Welding Symbol Interpretation	20
Unit 3	Oxyfuel Gas Cutting and Welding	20
Unit 4	Shielded Metal Arc Welding (SMAW)	85

WELDING II

Unit No.	Unit Name	Number of Days
Unit 1	Occupational Orientation and Safety Review	5
Unit 2	Shielded Metal Arc Welding (SMAW) (Continued)	75
Unit 3	Gas Metal Arc Welding (GMAW) Short Arc	25
Unit 4	Gas Tungsten Arc Welding (GTAW)	5
Unit 5	Arc Cutting Principles and Practices	5
Unit 6	Drawing and Welding Symbol Interpretation (Continued)	15
Unit 7	Job Seeking Skills	5

SECTION I:

CURRICULUM FRAMEWORK

FOR

WELDING

CURRICULUM FRAMEWORK

Course Name: Welding I

Course CIP Code: 48.0508

Course Description: The Welding curriculum is designed to prepare the student for entry level employment in the field of welding. Students in Welding I complete study in occupational orientation, safety, drawing and welding symbol interpretation, oxyfuel gas cutting and welding, and shielded metal arc welding (SMAW). (2-2½ Carnegie Units, depending upon time spent in the course)

Competencies and Suggested Objectives:

1. Explain vocational policies, procedures, and requirements.
   a. Describe grading procedures used in the school.
   b. Describe vocational policies.
   c. Describe school attendance policies.
   d. Identify key elements in the student handbook, including student behavior and clothing requirements.

   Related Academic Topics (See Appendix A): C1
   Workplace Skills (See Appendix B): WP2
2. Apply safety laws and standards used in welding.
   a. Describe state eye safety law, including appropriate times for wearing safety glasses.
   b. Define terms associated with safety including accident, safety, first aid, hazardous materials, and OSHA.
   c. Associate the colors of the safety code with their correct application.
   d. Describe rules for personal and general shop safety related to welding including hygiene, clothing, avoidance of horseplay, shop housekeeping, ventilation, safety equipment, location of fire safety and first aid equipment, shop layout, hand tools, power tools, lifting procedures, vehicles, flammable liquids, hazardous materials, electrical safety, and pertinent safety codes.

   Related Academic Topics (See Appendix A): C2, C4, C6, S8
   Workplace Skills (See Appendix B): WP2
3. Identify organizations associated with welding.
   a. Describe the programs and services of the American Welding Society (AWS).
   b. Describe the local student organizations associated with welding and the activities provided (Vocational Industrial Clubs of America and American Welding Society Student Chapter).
   c. Identify the source of the National Welding Codes (AWS).

Related Academic Topics (See Appendix A): C2, C4, C6, S8
Workplace Skills (See Appendix B): WP2

4. Describe requirements for a successful welder.
   a. Describe job opportunities for welders.
   b. Identify attitudes and work ethics needed by welders.

   Related Academic Topics (See Appendix A): C4
   Workplace Skills (See Appendix B): WP2
5. Interpret basic elements of a drawing or sketch.
   a. Describe the basic elements of a drawing or sketch.
   b. Recognize the three basic views in a drawing.
   c. Demonstrate the ability to perform measurements.
   d. Demonstrate basic math in welding.
   e. Demonstrate use of layout tools.

   Related Academic Topics (See Appendix A): C2, C4, M1, M4, M5, M7
   Workplace Skills (See Appendix B): WP2, WP5
6. Identify sources of welding symbol information.
   a. Recognize basic joints, basic welds, and basic welding symbols, including butt, lap, corner, edge, and T joints.
   b. Recognize ferrous and non-ferrous metals.

   Related Academic Topics (See Appendix A): C2, C4, M1, M4, M5, M7
   Workplace Skills (See Appendix B): WP2, WP5
7. Perform safety inspections of equipment and accessories.
   a. Identify the parts of gas cutting equipment and accessories.
   b. Identify safety ventilation required for use of industrial gases.
   c. Set up a gas welding and cutting station with all safety equipment required.
   d. Conduct a leak test of equipment using soapy water.

   Related Academic Topics (See Appendix A): C1, C2, C3, C4, S5, S8
   Workplace Skills (See Appendix B): WP1, WP5, WP6
8. Demonstrate procedures for cutting mild steel with oxyacetylene cutting equipment.
   a. Light and adjust cutting torch.
   b. Preheat metal to required temperature.
   c. Make a 90-degree cut in mild steel.

   Related Academic Topics (See Appendix A): C1, C3, M4, M5, S6, S8
   Workplace Skills (See Appendix B): WP5, WP6
9. Demonstrate procedures for welding mild steel with oxyacetylene welding equipment.
   a. Adjust welding torch for neutral flame.
   b. Perform fusion weld with and without filler rod.

   Related Academic Topics (See Appendix A): M4, M5, S6, S8
   Workplace Skills (See Appendix B): WP4, WP5, WP6
10. Perform safety inspections of equipment and accessories.
    a. Identify safety rules related to SMAW.

b. Identify safety ventilation required for use of industrial gases.

Related Academic Topics (See Appendix A): C1, C3, S6, S8
Workplace Skills (See Appendix B): WP1, WP4, WP5

11. Identify types of welding machines and their accessories.
    a. Describe AC/DC welding equipment.
    b. Identify welding electrodes, their characteristics and applications.
    c. Describe welding positions, including flat, horizontal, vertical, and overhead.

    Related Academic Topics (See Appendix A): C1, C3, S6, S8
    Workplace Skills (See Appendix B): WP1, WP4, WP5
12. Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.
    a. Demonstrate procedures to strike an arc, form a puddle, and control puddle.
    b. Build a pad on mild steel in flat position.
    c. Perform fillet weld according to teacher specifications with mild steel electrode (E6010/E6011).

    Related Academic Topics (See Appendix A): C1, C3, S6, S8
    Workplace Skills (See Appendix B): WP1, WP4, WP5

CURRICULUM FRAMEWORK

Course Name: Welding II

Course CIP Code: 48.0517

Course Description: The Welding curriculum is designed to prepare the student for entry level employment in the field of welding. Students in Welding II complete study in occupational orientation and safety review, shielded metal arc welding (SMAW) (continued), gas tungsten arc welding (GTAW), arc cutting principles and practices, drawing and welding symbol interpretation (continued), and job seeking skills. (2-2½ Carnegie Units, depending upon time spent in the course)

Competencies and Suggested Objectives:

1. Explain vocational policies, procedures, and requirements.
   a. Describe grading procedures used in the school.
   b. Describe vocational policies.
   c. Describe school attendance policies.
   d. Identify key elements in the student handbook, including student behavior and clothing requirements.

   Related Academic Topics (See Appendix A): C1
   Workplace Skills (See Appendix B): WP2
2. Apply safety laws and standards used in welding.
   a. Describe state eye safety law, including appropriate times for wearing safety glasses.
   b. Define terms associated with safety including accident, safety, first aid, hazardous materials, and OSHA.
   c. Associate the colors of the safety code with their correct application.
   d. Describe rules for personal and general shop safety related to welding including hygiene, clothing, avoidance of horseplay, shop housekeeping, ventilation, safety equipment, location of fire safety and first aid equipment, shop layout, hand tools, power tools, lifting procedures, vehicles, flammable liquids, hazardous materials, electrical safety, and pertinent safety codes.

   Related Academic Topics (See Appendix A): C2, C4, C6, S8
   Workplace Skills (See Appendix B): WP2
3. Identify organizations associated with welding.
   a. Describe the programs and services of the American Welding Society (AWS).
   b. Describe the local student organizations associated with welding and the activities provided (Vocational Industrial Clubs of America and American Welding Society Student Chapter).
   c. Identify the source of the National Welding Codes (AWS).

Related Academic Topics (See Appendix A): C2, C4, C6, S8
Workplace Skills (See Appendix B): WP2

4. Describe requirements for a successful welder.
   a. Describe job opportunities for welders.
   b. Identify attitudes and work ethics needed by welders.

   Related Academic Topics (See Appendix A): C4
   Workplace Skills (See Appendix B): WP2
5. Perform safety inspections of equipment and accessories.
   a. Identify safety rules related to SMAW.
   b. Identify safety ventilation required for use of industrial gases.

   Related Academic Topics (See Appendix A): C1, C6, S6, S8
   Workplace Skills (See Appendix B): WP1, WP4, WP5
6. Identify types of welding machines and their accessories.
   a. Describe AC/DC welding equipment.
   b. Identify welding electrodes, their characteristics and applications.
   c. Describe welding positions, including flat, horizontal, vertical, and overhead.

   Related Academic Topics (See Appendix A): C1, C6, S6, S8
   Workplace Skills (See Appendix B): WP1, WP4, WP5
7. Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.
   a. Demonstrate procedures to strike an arc, form a puddle, and control puddle.
   b. Build a pad on mild steel in flat position.
   c. Perform fillet weld according to teacher specifications with mild steel electrode (E7018).

   Related Academic Topics (See Appendix A): C1, C3, S6, S8
   Workplace Skills (See Appendix B): WP1, WP4, WP5
8. Perform safety inspections of equipment and accessories.
   a. Identify safety rules related to GMAW.
   b. Identify safety ventilation required for use of industrial gases.

   Related Academic Topics (See Appendix A): M4, S8
   Workplace Skills (See Appendix B): WP2, WP4, WP5, WP6
9. Identify types of welding machines and their accessories.
   a. Describe GMAW equipment and various shielding gases.
   b. Identify welding filler wires, their characteristics and applications.
   c. Describe welding positions, including flat, horizontal, vertical, and overhead.

   Related Academic Topics (See Appendix A): M4, S8
   Workplace Skills (See Appendix B): WP2, WP4, WP5, WP6

10. Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.
    a. Demonstrate procedures to initiate an arc, form a puddle, and control puddle.
    b. Deposit stringer beads on mild steel in flat position.
    c. Perform fillet weld according to teacher specifications with GMAW process.
    d. Perform fillet weld according to teacher specifications with flux cored arc welding (FCAW) process.

    Related Academic Topics (See Appendix A): M4, S8
    Workplace Skills (See Appendix B): WP2, WP4, WP5, WP6
11. Perform safety inspections of equipment and accessories.
    a. Identify safety rules related to GTAW.
    b. Identify safety ventilation required for use of industrial gases.

    Related Academic Topics (See Appendix A): S8
    Workplace Skills (See Appendix B): WP2, WP4, WP5, WP6
12. Identify types of welding machines and their accessories.
    a. Describe GTAW equipment and various shielding gases.
    b. Identify welding filler rods and their characteristics and applications.

    Related Academic Topics (See Appendix A): C6
    Workplace Skills (See Appendix B): WP2, WP4, WP5, WP6
13. Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.
    a. Demonstrate procedures to initiate an arc, form a puddle, and control puddle.
    b. Deposit stringer beads on mild steel in flat position.

    Related Academic Topics (See Appendix A): C3, C4, S6
    Workplace Skills (See Appendix B): WP4, WP5, WP6
14. Explain the principles of air carbon arc cutting (CAC-A).
    a. Describe the applications of CAC-A.
    b. Describe the equipment to be used with CAC-A.

    Related Academic Topics (See Appendix A): C1, C6, S8
    Workplace Skills (See Appendix B): WP2
15. Perform Plasma Arc Cutting (PAC).
    a. Perform safety inspections of equipment and accessories.
    b. Set up for manual plasma arc cutting operations.
    c. Operate manual plasma arc cutting equipment.

    Related Academic Topics (See Appendix A): C3, S8
    Workplace Skills (See Appendix B): WP2, WP5
16. Interpret basic elements of a drawing or sketch.
    a. Define the basic elements in welding drawings, including lines, dimensions, and notes.
    b. Prepare a simple sketch for the fabrication of a part using the three views.
    c. Interpret basic welding symbol information.

d. Fabricate a part from a drawing or sketch.

Related Academic Topics (See Appendix A): C2, C6, M4, M5, M7, S8
Workplace Skills (See Appendix B): WP2, WP5

17. Describe ways to arrange a job interview.
    a. Arrange a job interview using available resources.
    b. Role play a job interview using accepted procedures.

    Related Academic Topics (See Appendix A): C2, C3, C5, C6
    Workplace Skills (See Appendix B): WP1, WP3, WP6
18. Describe what employers look for and why job applicants need to be well prepared.
    a. Explain why preparation is essential to job seeking, including qualities of neatness and cleanliness, good attendance record, accident-free, skillful, ability to complete application forms, and ability to meet conditions imposed by employers.

    Related Academic Topics (See Appendix A): C6
    Workplace Skills (See Appendix B): WP6
19. Prepare an effective resume/personal data sheet and letter of application.
    a. Demonstrate the ability to organize a resume/personal data sheet, use correct grammar and vocabulary, and present appropriate work experiences.
    b. Demonstrate the ability to compose a letter of application, including content, correct grammar and vocabulary, spelling, and punctuation.

    Related Academic Topics (See Appendix A): C4, C6
    Workplace Skills (See Appendix B): WP6
20. Fill out an application for employment as a welder.
    a. Demonstrate the ability to fill out an application correctly and legibly using personal information requested.
    b. Document qualifications and present identification.

    Related Academic Topics (See Appendix A): C1, C6
    Workplace Skills (See Appendix B): WP6

SECTION II:

CURRICULUM GUIDE

FOR

WELDING

WELDING I

WELDING I
UNIT 1: OCCUPATIONAL ORIENTATION AND SAFETY **(10 days)**

Competencies and Suggested Objectives:

1. Explain vocational policies, procedures, and requirements.
   a. Describe grading procedures used in the school.
   b. Describe vocational policies.
   c. Describe school attendance policies.
   d. Identify key elements in the student handbook, including student behavior and clothing requirements.

   Related Academic Topics (See Appendix A): C1
   Workplace Skills (See Appendix B): WP2
2. Apply safety laws and standards used in welding.
   a. Describe state eye safety law, including appropriate times for wearing safety glasses.
   b. Define terms associated with safety including accident, safety, first aid, hazardous materials, and OSHA.
   c. Associate the colors of the safety code with their correct application.
   d. Describe rules for personal and general shop safety related to welding including hygiene, clothing, avoidance of horseplay, shop housekeeping, ventilation, safety equipment, location of fire safety and first aid equipment, shop layout, hand tools, power tools, lifting procedures, vehicles, flammable liquids, hazardous materials, electrical safety, and pertinent safety codes.

   Related Academic Topics (See Appendix A): C2, C4, C6, S8
   Workplace Skills (See Appendix B): WP2
3. Identify organizations associated with welding.
   a. Describe the programs and services of the American Welding Society (AWS).
   b. Describe the local student organizations associated with welding and the activities provided (Vocational Industrial Clubs of America and American Welding Society Student Chapter).
   c. Identify the source of the National Welding Codes (AWS).

   Related Academic Topics (See Appendix A): C2, C4, C6, S8
   Workplace Skills (See Appendix B): WP2
4. Describe requirements for a successful welder.
   a. Describe job opportunities for welders.
   b. Identify attitudes and work ethics needed by welders.

   Related Academic Topics (See Appendix A): C4
   Workplace Skills (See Appendix B): WP2

Suggested Teaching Strategies:

1. *Explain vocational policies, procedures, and requirements.*
   a. *Provide examples of grading procedures used in the school.*
   b. *Provide written explanations of vocational policies.*
   c. *Discuss school attendance policies.*
   d. *Assist students to identify key elements in the student handbook, including student behavior and clothing requirements.*
2. *Apply safety laws and standards used in welding.*
   a. *Provide copies of the state eye safety law, including appropriate times for wearing safety glasses.*
   b. *Discuss terms associated with safety including accident, safety, first aid, hazardous materials, and OSHA.*
   c. *Present examples of the colors of the safety code with their correct application.*
   d. *Discuss rules for personal and general shop safety related to welding including hygiene, clothing, avoidance of horseplay, shop housekeeping, ventilation, safety equipment, location of fire safety and first aid equipment, shop layout, hand tools, power tools, lifting procedures, vehicles, flammable liquids, hazardous materials, electrical safety, and pertinent safety codes.*
3. *Identify organizations associated with welding.*
   a. *Discuss the services and programs offered by the American Welding Society (AWS).*
   b. *Assist students to identify the local student organizations associated with welding and the activities provided for student participation, including the Student Chapter of the American Welding Society and Vocational Industrial Clubs of America.*
   c. *Assist students to identify the source of the National Welding Codes (AWS).*
4. *Describe requirements for a successful welder.*
   a. *Show "Heavy Metal: Hot Careers in Welding," AWS.*
   b. *Assist students to identify attitudes and work ethics needed by welders.*

Suggested Assessment Strategies:

1. *Explain vocational policies, procedures, and requirements.*
   a. *Test - Describe grading procedures used in the school.*
   b. *Test - Describe vocational policies.*
   c. *Test - Describe school attendance policies.*
   d. *Assignment - Identify key elements in the student handbook, including student behavior and clothing requirements.*

2. *Apply safety laws and standards used in welding.*
   a. *Assignment - Describe state eye safety law, including appropriate times for wearing safety glasses.*
   b. *Test - Define terms associated with safety including accident, safety, first aid, hazardous materials, and OSHA.*
   c. *Assignment - Associate the colors of the safety code with their correct application.*
   d. *Test - Describe rules for personal and general shop safety related to welding including hygiene, clothing, avoidance of horseplay, shop housekeeping, ventilation, safety equipment, location of fire safety and first aid equipment, shop layout, hand tools, power tools, lifting procedures, vehicles, flammable liquids, hazardous materials, electrical safety, and pertinent safety codes.*
3. *Identify organizations associated with welding.*
   a. *Assignment - Describe the programs and services of the American Welding Society (AWS).*
   b. *Assignment - Describe the local student organizations associated with welding and the activities provided (Vocational Industrial Clubs of America and American Welding Society Student Chapter).*
   c. *Assignment - Identify the source of the National Welding Codes (AWS).*
4. *Describe requirements for a successful welder.*
   a. *Test - Describe job opportunities for welders.*
   b. *Assignment - Identify attitudes and work ethics needed by welders.*

Suggested References:

American Welding Society. Guide for the Training and Qualification of Welding Personnel: Entry Level Welder. Miami, FL: Author. 1995.

American Welding Society. Safety in Welding, Cutting, and Allied Processes (Z49.1.94). Miami, FL: Author. 1994.

American Welding Society. Specification for Qualification and Certification for Entry Level Welders. Miami, FL: Author. 1995.

American Welding Society. Welding Educator's Library. Miami, FL: Author. 1995.

MAVCC. Fundamentals of Welding. Stillwater, OK: Author. 1992.

WELDING I
UNIT 2: DRAWING AND WELDING SYMBOL INTERPRETATION (20 days)

Competencies and Suggested Objectives:

1. Interpret basic elements of a drawing or sketch.
   a. Describe the basic elements of a drawing or sketch.
   b. Recognize the three basic views in a drawing.
   c. Demonstrate the ability to perform measurements.
   d. Demonstrate basic math in welding.
   e. Demonstrate use of layout tools.

   Related Academic Topics (See Appendix A): C2, C4, M1, M4, M5, M7
   Workplace Skills (See Appendix B): WP2, WP5
2. Identify sources of welding symbol information.
   a. Recognize basic joints, basic welds, and basic welding symbols, including butt, lap, corner, edge, and T joints.
   b. Recognize ferrous and non-ferrous metals.

   Related Academic Topics (See Appendix A): C2, C4, M1, M4, M5, M7
   Workplace Skills (See Appendix B): WP2, WP5

Suggested Teaching Strategies:

1. *Interpret basic elements of a drawing or sketch.*
   a. Assist students to describe the basic elements of a welding drawing or sketch.
   b. Demonstrate the three basic views in a drawing.
   c. Demonstrate how to perform measurements.
   d. Assist students to use basic math in welding.
   e. Assist students to use layout tools.
2. *Identify sources of welding symbol information.*
   a. Assist students to recognize basic joints, basic welds, and basic welding symbols, including butt, lap, corner, edge, and T-joints.
   b. Recognize ferrous and non-ferrous metals.

Suggested Assessment Strategies:

1. *Interpret basic elements of a drawing or sketch.*
   a. Test - Describe the basic elements of a drawing or sketch.
   b. Test - Recognize the three basic views in a drawing.
   c. Performance Activity - Demonstrate the ability to perform measurements.
   d. Performance Activity - Demonstrate basic math in welding.
   e. Performance Activity - Demonstrate use of layout tools.

2. *Identify sources of welding symbol information.*
   a. *Performance Activity - Recognize basic joints, basic welds, and basic welding symbols, including butt, lap, corner, edge, and T-joints.*
   b. *Recognize ferrous and non-ferrous metals.*

Suggested References:

American Welding Society. Guide for the Training and Qualification of Welding Personnel: Entry Level Welder. Miami, FL: Author. 1995.

American Welding Society. Specification for Qualification and Certification for Entry Level Welders. Miami, FL: Author. 1995.

American Welding Society. Welding Educator's Library. Miami, FL: Author. 1995.

MAVCC. Fundamentals of Welding. Stillwater, OK: Author. 1992.

WELDING I
UNIT 3: OXYFUEL GAS CUTTING AND WELDING **(20 days)**

Competencies and Suggested Objectives:

1. Perform safety inspections of equipment and accessories.
   a. Identify the parts of gas cutting equipment and accessories.
   b. Identify safety ventilation required for use of industrial gases.
   c. Set up a gas welding and cutting station with all safety equipment required.
   d. Conduct a leak test of equipment using soapy water.
   Related Academic Topics (See Appendix A): C1, C2, C3, C4, S5, S8
   Workplace Skills (See Appendix B): WP1, WP5, WP6
2. Demonstrate procedures for cutting mild steel with oxyacetylene cutting equipment.
   a. Light and adjust cutting torch.
   b. Preheat metal to required temperature.
   c. Make a 90-degree cut in mild steel.
   Related Academic Topics (See Appendix A): C1, C3, M4, M5, S6, S8
   Workplace Skills (See Appendix B): WP5, WP6
3. Demonstrate procedures for welding mild steel with oxyacetylene welding equipment.
   a. Adjust welding torch for neutral flame.
   b. Perform fusion weld with and without filler rod.
   Related Academic Topics (See Appendix A): M4, M5, S6, S8
   Workplace Skills (See Appendix B): WP4, WP5, WP6

Suggested Teaching Strategies:

1. *Perform safety inspections of equipment and accessories.*
   a. Assist students to identify the parts of gas cutting equipment and accessories.
   b. Assist students to identify safety ventilation required for use of industrial gases.
   c. Demonstrate how to set up a gas welding and cutting station with all safety equipment required.
   d. Demonstrate how to leak test equipment using soapy water.
2. *Demonstrate procedures for cutting mild steel with oxyacetylene cutting equipment.*
   a. Demonstrate procedures to light and adjust cutting torch.
   b. Demonstrate procedures to preheat metal to required temperature.
   c. Demonstrate procedures to make a 90-degree cut in mild steel.

3. *Demonstrate procedures for welding mild steel with oxyacetylene welding equipment.*
   a. *Demonstrate procedures to adjust welding torch for neutral flame.*
   b. *Demonstrate procedures to perform fusion weld with and without filler rod.*

Suggested Assessment Strategies:

1. *Perform safety inspections of equipment and accessories.*
   a. *Test - Identify the parts of gas cutting equipment and accessories.*
   b. *Test - Identify safety ventilation required for use of industrial gases.*
   c. *Performance Activity - Set up a gas welding and cutting station with all safety equipment required.*
   d. *Performance Activity - Conduct a leak test of equipment using soapy water.*
2. *Demonstrate procedures for cutting mild steel with oxyacetylene cutting equipment.*
   a. *Performance Activity - Light and adjust cutting torch.*
   b. *Performance Activity - Preheat metal to required temperature.*
   c. *Performance Activity - Make a 90-degree cut in mild steel.*
3. *Demonstrate procedures for welding mild steel with oxyacetylene welding equipment.*
   a. *Performance Activity - Adjust welding torch for neutral flame.*
   b. *Performance Activity - Perform fusion weld with and without filler rod.*

Suggested References:

American Welding Society. Guide for the Training and Qualification of Welding Personnel: Entry Level Welder. Miami, FL: Author. 1995.

American Welding Society. Specification for Qualification and Certification for Entry Level Welders. Miami, FL: Author. 1995.

American Welding Society. Welding Educator's Library. Miami, FL: Author. 1995.

MAVCC. Oxyacetylene Welding and Cutting (2nd ed.). Stillwater, OK: Author. 1992.

WELDING I
UNIT 4: SHIELDED METAL ARC WELDING (SMAW) **(85 days)**

Competencies and Suggested Objectives:

1. Perform safety inspections of equipment and accessories.
   a. Identify safety rules related to SMAW.
   b. Identify safety ventilation required for use of industrial gases.
   Related Academic Topics (See Appendix A): C1, C3, S6, S8
   Workplace Skills (See Appendix B): WP1, WP4, WP5
2. Identify types of welding machines and their accessories.
   a. Describe AC/DC welding equipment.
   b. Identify welding electrodes, their characteristics and applications.
   c. Describe welding positions, including flat, horizontal, vertical, and overhead.
   Related Academic Topics (See Appendix A): C1, C3, S6, S8
   Workplace Skills (See Appendix B): WP1, WP4, WP5
3. Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.
   a. Demonstrate procedures to strike an arc, form a puddle, and control puddle.
   b. Build a pad on mild steel in flat position.
   c. Perform fillet weld according to teacher specifications with mild steel electrode (E6010/E6011).
   Related Academic Topics (See Appendix A): C1, C3, S6, S8
   Workplace Skills (See Appendix B): WP1, WP4, WP5

Suggested Teaching Strategies:

1. *Perform safety inspections of equipment and accessories.*
   a. Assist students to identify safety rules related to SMAW.
   b. Assist students to identify safety ventilation required for use of industrial gases.
2. *Identify types of welding machines and their accessories.*
   a. Assignment to describe AC/DC welding equipment.
   b. Assist students to identify welding electrodes, their characteristics and applications.
   c. Assist students to describe welding positions, including flat, horizontal, vertical, and overhead.
3. *Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.*
   a. Demonstrate procedures to strike an arc, form a puddle, and control puddle.

b. Build a pad on mild steel in flat position.
c. Perform fillet weld with mild steel electrode (E6010/E6011).

Suggested Assessment Strategies:

1. *Perform safety inspections of equipment and accessories.*
   a. Test - Identify safety rules related to SMAW.
   b. Test - Identify safety ventilation required for use of industrial gases.
2. *Identify types of welding machines and their accessories.*
   a. Test - Describe AC/DC welding equipment.
   b. Performance Activity - Identify welding electrodes, their characteristics and applications.
   c. Test - Describe welding positions, including flat, horizontal, vertical, and overhead.
3. *Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.*
   a. Performance Activity - Demonstrate procedures to strike an arc, form a puddle, and control puddle.
   b. Performance Activity - Build a pad on mild steel in flat position.
   c. Performance Activity - Perform fillet weld according to teacher specifications with mild steel electrode (E6010/E6011).

Suggested References:

American Welding Society. Guide for the Training and Qualification of Welding Personnel: Entry Level Welder. Miami, FL: Author. 1995.

American Welding Society. Specification for Qualification and Certification for Entry Level Welders. Miami, FL: Author. 1995.

American Welding Society. Welding Educator's Library. Miami, FL: Author. 1995.

MAVCC. Shielded Metal Arc Welding (SMAW) (2nd ed.). Stillwater, OK: Author. 1992.

WELDING II

WELDING II
UNIT 1: OCCUPATIONAL ORIENTATION AND SAFETY REVIEW (5 days)

Competencies and Suggested Objectives:

1. Explain vocational policies, procedures, and requirements.
   a. Describe grading procedures used in the school.
   b. Describe vocational policies.
   c. Describe school attendance policies.
   d. Identify key elements in the student handbook, including student behavior and clothing requirements.

   Related Academic Topics (See Appendix A): C1
   Workplace Skills (See Appendix B): WP2
2. Apply safety laws and standards used in welding.
   a. Describe state eye safety law, including appropriate times for wearing safety glasses.
   b. Define terms associated with safety including accident, safety, first aid, hazardous materials, and OSHA.
   c. Associate the colors of the safety code with their correct application.
   d. Describe rules for personal and general shop safety related to welding including hygiene, clothing, avoidance of horseplay, shop housekeeping, ventilation, safety equipment, location of fire safety and first aid equipment, shop layout, hand tools, power tools, lifting procedures, vehicles, flammable liquids, hazardous materials, electrical safety, and pertinent safety codes.

   Related Academic Topics (See Appendix A): C2, C4, C6, S8
   Workplace Skills (See Appendix B): WP2
3. Identify organizations associated with welding.
   a. Describe the programs and services of the American Welding Society (AWS).
   b. Describe the local student organizations associated with welding and the activities provided (Vocational Industrial Clubs of America and American Welding Society Student Chapter).
   c. Identify the source of the National Welding Codes (AWS).

   Related Academic Topics (See Appendix A): C2, C4, C6, S8
   Workplace Skills (See Appendix B): WP2
4. Describe requirements for a successful welder.
   a. Describe job opportunities for welders.
   b. Identify attitudes and work ethics needed by welders.

   Related Academic Topics (See Appendix A): C4
   Workplace Skills (See Appendix B): WP2

Suggested Teaching Strategies:

1. *Explain vocational policies, procedures, and requirements.*
   a. *Provide examples of grading procedures used in the school.*
   b. *Provide written explanations of vocational policies.*
   c. *Discuss school attendance policies.*
   d. *Assist students to identify key elements in the student handbook, including student behavior and clothing requirements .*
2. *Apply safety laws and standards used in welding.*
   a. *Provide copies of the state eye safety law, including appropriate times for wearing safety glasses.*
   b. *Discuss terms associated with safety including accident, safety, first aid, hazardous materials, and OSHA.*
   c. *Present examples of the colors of the safety code with their correct application.*
   d. *Discuss rules for personal and general shop safety related to welding including hygiene, clothing, avoidance of horseplay, shop housekeeping, ventilation, safety equipment, location of fire safety and first aid equipment, shop layout, hand tools, power tools, lifting procedures, vehicles, flammable liquids, hazardous materials, electrical safety, and pertinent safety codes.*
3. *Identify organizations associated with welding.*
   a. *Discuss the services and programs offered by the American Welding Society (AWS).*
   b. *Assist students to identify the local student organizations associated with welding and the activities provided for student participation, including the Student Chapter of the American Welding Society and Vocational Industrial Clubs of America.*
   c. *Assist students to identify the source of the National Welding Codes (AWS).*
4. *Describe requirements for a successful welder.*
   a. *Show "Heavy Metal: Hot Careers in Welding," AWS.*
   b. *Assist students to identify attitudes and work ethics needed by welders.*

Suggested Assessment Strategies:

1. *Explain vocational policies, procedures, and requirements.*
   a. *Test - Describe grading procedures used in the school.*
   b. *Test - Describe vocational policies.*
   c. *Test - Describe school attendance policies.*
   d. *Assignment - Identify key elements in the student handbook, including student behavior and clothing requirements.*

2. *Apply safety laws and standards used in welding.*
   a. *Assignment - Describe state eye safety law, including appropriate times for wearing safety glasses.*
   b. *Test - Define terms associated with safety including accident, safety, first aid, hazardous materials, and OSHA.*
   c. *Assignment - Associate the colors of the safety code with their correct application.*
   d. *Test - Describe rules for personal and general shop safety related to welding including hygiene, clothing, avoidance of horseplay, shop housekeeping, ventilation, safety equipment, location of fire safety and first aid equipment, shop layout, hand tools, power tools, lifting procedures, vehicles, flammable liquids, hazardous materials, electrical safety, and pertinent safety codes.*
3. *Identify organizations associated with welding.*
   a. *Assignment - Describe the programs and services of the American Welding Society (AWS).*
   b. *Assignment - Describe the local student organizations associated with welding and the activities provided (Vocational Industrial Clubs of America and American Welding Society Student Chapter).*
   c. *Assignment - Identify the source of the National Welding Codes (AWS).*
4. *Describe requirements for a successful welder.*
   a. *Test - Describe job opportunities for welders.*
   b. *Assignment - Identify attitudes and work ethics needed by welders.*

Suggested References:

American Welding Society. Guide for the Training and Qualification of Welding Personnel: Entry Level Welder. Miami, FL: Author. 1995.

American Welding Society. Safety in Welding, Cutting, and Allied Processes (Z49.1.94). Miami, FL: Author. 1994.

American Welding Society. Specification for Qualification and Certification for Entry Level Welders. Miami, FL: Author. 1995.

American Welding Society. Welding Educator's Library. Miami, FL: Author. 1995.

MAVCC. Fundamentals of Welding. Stillwater, OK: Author. 1992.

WELDING II
UNIT 2: SHIELDED METAL ARC WELDING (SMAW) (Continued) **(75 days)**

Competencies and Suggested Objectives:

1. Perform safety inspections of equipment and accessories.
   a. Identify safety rules related to SMAW.
   b. Identify safety ventilation required for use of industrial gases.
   Related Academic Topics (See Appendix A): C1, C6, S6, S8
   Workplace Skills (See Appendix B): WP1, WP4, WP5
2. Identify types of welding machines and their accessories.
   a. Describe AC/DC welding equipment.
   b. Identify welding electrodes, their characteristics and applications.
   c. Describe welding positions, including flat, horizontal, vertical, and overhead.
   Related Academic Topics (See Appendix A): C1, C6, S6, S8
   Workplace Skills (See Appendix B): WP1, WP4, WP5
3. Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.
   a. Demonstrate procedures to strike an arc, form a puddle, and control puddle.
   b. Build a pad on mild steel in flat position.
   c. Perform fillet weld according to teacher specifications with mild steel electrode (E7018).
   Related Academic Topics (See Appendix A): C1, C3, S6, S8
   Workplace Skills (See Appendix B): WP1, WP4, WP5

Suggested Teaching Strategies:

1. *Perform safety inspections of equipment and accessories.*
   a. *Assist students to identify safety rules related to SMAW.*
   b. *Assist students to identify safety ventilation required for use of industrial gases.*
2. *Identify types of welding machines and their accessories.*
   a. *Assignment to describe AC/DC welding equipment.*
   b. *Assist students to identify welding electrodes, their characteristics and applications.*
   c. *Assist students to describe welding positions, including flat, horizontal, vertical, and overhead.*
3. *Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.*
   a. *Demonstrate procedures to strike an arc, form a puddle, and control puddle.*

b. Build a pad on mild steel in flat position.
c. Perform fillet weld with mild steel electrode (E7018).

Suggested Assessment Strategies:

1. *Perform safety inspections of equipment and accessories.*
   a. *Test - Identify safety rules related to SMAW.*
   b. *Test - Identify safety ventilation required for use of industrial gases.*
2. *Identify types of welding machines and their accessories.*
   a. *Test - Describe AC/DC welding equipment.*
   b. *Performance Activity - Identify welding electrodes, their characteristics and applications.*
   c. *Test - Describe welding positions, including flat, horizontal, vertical, and overhead.*
3. *Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.*
   a. *Performance Activity - Demonstrate procedures to strike an arc, form a puddle, and control puddle.*
   b. *Performance Activity - Build a pad on mild steel in flat position.*
   c. *Performance Activity - Perform fillet weld according to teacher specifications with mild steel electrode (E7018).*

Suggested References:

American Welding Society. Guide for the Training and Qualification of Welding Personnel: Entry Level Welder. Miami, FL: Author. 1995.

American Welding Society. Specification for Qualification and Certification for Entry Level Welders. Miami, FL: Author. 1995.

American Welding Society. Welding Educator's Library. Miami, FL: Author. 1995.

MAVCC. Shielded Metal Arc Welding (SMAW) (2nd ed.). Stillwater, OK: Author. 1992.

WELDING II
UNIT 3: GAS METAL ARC WELDING (GMAW) SHORT ARC **(25 days)**

Competencies and Suggested Objectives:

1. Perform safety inspections of equipment and accessories.
   a. Identify safety rules related to GMAW.
   b. Identify safety ventilation required for use of industrial gases.
   Related Academic Topics (See Appendix A): M4, S8
   Workplace Skills (See Appendix B): WP2, WP4, WP5, WP6
2. Identify types of welding machines and their accessories.
   a. Describe GMAW equipment and various shielding gases.
   b. Identify welding filler wires, their characteristics and applications.
   c. Describe welding positions, including flat, horizontal, vertical, and overhead.
   Related Academic Topics (See Appendix A): M4, S8
   Workplace Skills (See Appendix B): WP2, WP4, WP5, WP6
3. Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.
   a. Demonstrate procedures to initiate an arc, form a puddle, and control puddle.
   b. Deposit stringer beads on mild steel in flat position.
   c. Perform fillet weld according to teacher specifications with GMAW process.
   d. Perform fillet weld according to teacher specifications with flux cored arc welding (FCAW) process.
   Related Academic Topics (See Appendix A): M4, S8
   Workplace Skills (See Appendix B): WP2, WP4, WP5, WP6

Suggested Teaching Strategies:

1. *Perform safety inspections of equipment and accessories.*
   a. Assist students to identify safety rules related to GMAW.
   b. Assist students to identify safety ventilation required for use of industrial gases.
2. *Identify types of welding machines and their accessories.*
   a. Assist students to describe GMAW equipment and various shielding gases.
   b. Assist students to identify welding filler wires, their characteristics and applications.
   c. Assist students to describe welding positions, including flat, horizontal, vertical, and overhead.

3. *Demonstrate ability to set up and perform welding operations on mild steel, according to established safety procedures.*
   a. *Demonstrate procedures to initiate an arc, form a puddle, and control puddle.*
   b. *Demonstrate procedures to deposit stringer beads on mild steel in flat position.*
   c. *Perform fillet weld with GMAW process.*
   d. *Perform fillet weld with flux-cored arc welding (FCAW) process.*

Suggested Assessment Strategies:

1. *Perform safety inspections of equipment and accessories.*
   a. *Test - Identify safety rules related to GMAW.*
   b. *Test - Identify safety ventilation required for use of industrial gases.*
2. *Identify types of welding machines and their accessories.*
   a. *Test - Describe GMAW equipment and various shielding gases.*
   b. *Test - Identify welding filler wires, their characteristics and applications.*
   c. *Test - Describe welding positions, including flat, horizontal, vertical, and overhead.*
3. *Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.*
   a. *Performance Activity - Demonstrate procedures to initiate an arc, form a puddle, and control puddle.*
   b. *Performance Activity - Deposit stringer beads on mild steel in flat position.*
   c. *Performance Activity - Perform fillet weld according to teacher specifications with GMAW process.*
   d. *Performance Activity - Perform fillet weld according to teacher specifications with flux cored arc welding (FCAW) process.*

Suggested References:

American Welding Society. Guide for the Training and Qualification of Welding Personnel: Entry Level Welder. Miami, FL: Author. 1995.

American Welding Society. Specification for Qualification and Certification for Entry Level Welders. Miami, FL: Author. 1995.

American Welding Society. Welding Educator's Library. Miami, FL: Author. 1995.

MAVCC. Gas Metal Arc Welding and Flux-Cored Arc Welding (GMAW/FCAW) (2nd ed.). Stillwater, OK: Author. 1992.

WELDING II
UNIT 4: GAS TUNGSTEN ARC WELDING (GTAW) **(5 days)**

Competencies and Suggested Objectives:

1. Perform safety inspections of equipment and accessories.
   a. Identify safety rules related to GTAW.
   b. Identify safety ventilation required for use of industrial gases.
   Related Academic Topics (See Appendix A): S8
   Workplace Skills (See Appendix B): WP2, WP4, WP5, WP6
2. Identify types of welding machines and their accessories.
   a. Describe GTAW equipment and various shielding gases.
   b. Identify welding filler rods and their characteristics and applications.
   Related Academic Topics (See Appendix A): C6
   Workplace Skills (See Appendix B): WP2, WP4, WP5, WP6
3. Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.
   a. Demonstrate procedures to initiate an arc, form a puddle, and control puddle.
   b. Deposit stringer beads on mild steel in flat position.
   Related Academic Topics (See Appendix A): C3, C4, S6
   Workplace Skills (See Appendix B): WP4, WP5, WP6

Suggested Teaching Strategies:

1. *Perform safety inspections of equipment and accessories.*
   a. Assist students to identify safety rules related to GTAW.
   b. Assist students to identify safety ventilation required for use of industrial gases.
2. *Identify types of welding machines and their accessories.*
   a. Assist students to describe GTAW equipment and various shielding gases.
   b. Performance exercise to identify welding filler rods and their characteristics and applications.
3. *Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.*
   a. Demonstrate procedures to initiate an arc, form a puddle, and control puddle.
   b. Demonstrate procedures to deposit stringer beads on mild steel in flat position.

Suggested Assessment Strategies:

1. *Perform safety inspections of equipment and accessories.*
   a. *Test - Identify safety rules related to GTAW.*
   b. *Test - Identify safety ventilation required for use of industrial gases.*
2. *Identify types of welding machines and their accessories.*
   a. *Test - Describe GTAW equipment and various shielding gases.*
   b. *Performance Activity - Identify welding filler rods and their characteristics and applications.*
3. *Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.*
   a. *Performance Activity - Demonstrate procedures to initiate an arc, form a puddle, and control puddle.*
   b. *Performance Activity - Deposit stringer beads on mild steel in flat position.*

Suggested References:

American Welding Society. Guide for the Training and Qualification of Welding Personnel: Entry Level Welder. Miami, FL: Author. 1995.

American Welding Society. Specification for Qualification and Certification for Entry Level Welders. Miami, FL: Author. 1995.

American Welding Society. Welding Educator's Library. Miami, FL: Author. 1995.

MAVCC. Gas Tungsten Arc Welding and Plasma Arc Cutting. Stillwater, OK: Author. 1992.

WELDING II
UNIT 5: ARC CUTTING PRINCIPLES AND PRACTICES **(5 days)**

Competencies and Suggested Objectives:

1. Explain the principles of air carbon arc cutting (CAC-A).
   a. Describe the applications of CAC-A.
   b. Describe the equipment to be used with CAC-A.
   Related Academic Topics (See Appendix A): C1, C6, S8
   Workplace Skills (See Appendix B): WP2
2. Perform Plasma Arc Cutting (PAC).
   a. Perform safety inspections of equipment and accessories.
   b. Set up for manual plasma arc cutting operations.
   c. Operate manual plasma arc cutting equipment.
   Related Academic Topics (See Appendix A): C3, S8
   Workplace Skills (See Appendix B): WP2, WP5

Suggested Teaching Strategies:

1. *Explain the principles of air carbon arc cutting (CAC-A).*
   a. Assist students to describe the applications of CAC-A.
   b. Assist students to describe the equipment to be used with CAC-A.
2. *Perform Plasma Arc Cutting (PAC).*
   a. Demonstrate safety inspections of equipment and accessories.
   b. Demonstrate set-up for manual plasma arc cutting operations.
   c. Demonstrate operation of manual plasma arc cutting equipment.

Suggested Assessment Strategies:

1. *Explain the principles of air carbon arc cutting (CAC-A).*
   a. Test - Describe the applications of CAC-A.
   b. Test - Describe the equipment to be used with CAC-A.
2. *Perform Plasma Arc Cutting (PAC).*
   a. Assignment - Perform safety inspections of equipment and accessories.
   b. Performance Activity - Set up for manual plasma arc cutting operations.
   c. Performance Activity - Operate manual plasma arc cutting equipment.

Suggested References:

American Welding Society. Guide for the Training and Qualification of Welding Personnel: Entry Level Welder. Miami, FL: Author. 1995.

American Welding Society. Specification for Qualification and Certification for Entry Level Welders. Miami, FL: Author. 1995.

American Welding Society. Welding Educator's Library. Miami, FL: Author. 1995.

MAVCC. Gas Tungsten Arc Welding and Plasma Arc Cutting. Stillwater, OK: Author. 1992.

WELDING II
UNIT 6: DRAWING AND WELDING SYMBOL INTERPRETATION (15 days)
(Continued)

Competencies and Suggested Objectives:

1. Interpret basic elements of a drawing or sketch.
   a. Define the basic elements in welding drawings, including lines, dimensions, and notes.
   b. Prepare a simple sketch for the fabrication of a part using the three views.
   c. Interpret basic welding symbol information.
   d. Fabricate a part from a drawing or sketch.

   Related Academic Topics (See Appendix A): C2, C6, M4, M5, M7, S8
   Workplace Skills (See Appendix B): WP2, WP5

Suggested Teaching Strategies:

1. Interpret basic elements of a drawing or sketch.
   a. Discuss the basic elements in welding drawings, including lines, dimensions, and notes.
   b. Assist students in preparing a simple sketch for the fabrication of a part using the three views.
   c. Assist students to interpret basic welding symbol information.
   d. Demonstrate procedures to fabricate a part from a drawing or sketch.

Suggested Assessment Strategies:

1. Interpret basic elements of a drawing or sketch.
   a. Test - Define the basic elements in welding drawings, including lines, dimensions, and notes.
   b. Performance Activity - Prepare a simple sketch for the fabrication of a part using the three views.
   c. Performance Activity - Interpret basic welding symbol information.
   d. Performance Activity - Fabricate a part from a drawing or sketch.

Suggested References:

American Welding Society. Guide for the Training and Qualification of Welding Personnel: Entry Level Welder. Miami, FL: Author. 1995.

American Welding Society. Specification for Qualification and Certification for Entry Level Welders. Miami, FL: Author. 1995.

American Welding Society. Welding Educator's Library. Miami, FL: Author. 1995.

MAVCC. Fundamentals of Welding. Stillwater, OK: Author. 1992.

WELDING II
UNIT 7: JOB SEEKING SKILLS **(5 days)**

Competencies and Suggested Objectives:

1. Describe ways to arrange a job interview.
   a. Arrange a job interview using available resources.
   b. Role play a job interview using accepted procedures.
   Related Academic Topics (See Appendix A): C2, C3, C5, C6
   Workplace Skills (See Appendix B): WP1, WP3, WP6
2. Describe what employers look for and why job applicants need to be well prepared.
   a. Explain why preparation is essential to job seeking, including qualities of neatness and cleanliness, good attendance record, accident-free, skillful, ability to complete application forms, and ability to meet conditions imposed by employers.
   Related Academic Topics (See Appendix A): C6
   Workplace Skills (See Appendix B): WP6
3. Prepare an effective resume/personal data sheet and letter of application.
   a. Demonstrate the ability to organize a resume/personal data sheet, use correct grammar and vocabulary, and present appropriate work experiences.
   b. Demonstrate the ability to compose a letter of application, including content, correct grammar and vocabulary, spelling, and punctuation.
   Related Academic Topics (See Appendix A): C4, C6
   Workplace Skills (See Appendix B): WP6
4. Fill out an application for employment as a welder.
   a. Demonstrate the ability to fill out an application correctly and legibly using personal information requested.
   b. Document qualifications and present identification.
   Related Academic Topics (See Appendix A): C1, C6
   Workplace Skills (See Appendix B): WP6

Suggested Teaching Strategies:

1. *Describe ways to arrange a job interview.*
   a. *Assist students to arrange a job interview using available resources.*
   b. *Assist students to role play a job interview using accepted procedures.*

2. *Describe what employers look for and why job applicants need to be well prepared.*
   a. *Discuss why preparation is essential to job seeking, including qualities of neatness and cleanliness, good attendance record, accident-free, skillful, ability to complete application forms, and ability to meet conditions imposed by employers.*
3. *Prepare an effective resume/personal data sheet and letter of application.*
   a. *Assist students to demonstrate the ability to organize a resume/personal data sheet, use correct grammar and vocabulary, and present appropriate work experiences.*
   b. *Assist students to demonstrate the ability to compose a letter of application, including content, correct grammar and vocabulary, spelling, and punctuation.*
4. *Fill out an application for employment as a welder.*
   a. *Assist students to demonstrate the ability to fill out an application correctly and legibly using personal information requested.*
   b. *Assist students to document qualifications and present identification.*

Suggested Assessment Strategies:

1. *Describe ways to arrange a job interview.*
   a. *Performance Activity - Arrange a job interview using available resources.*
   b. *Performance Activity - Role play a job interview using accepted procedures.*
2. *Describe what employers look for and why job applicants need to be well prepared.*
   a. *Assignment - Explain why preparation is essential to job seeking, including qualities of neatness and cleanliness, good attendance record, accident-free, skillful, ability to complete application forms, and ability to meet conditions imposed by employers.*
3. *Performance Activity - Prepare an effective resume/personal data sheet and letter of application.*
   a. *Demonstrate the ability to organize a resume/personal data sheet, use correct grammar and vocabulary, and present appropriate work experiences.*
   b. *Demonstrate the ability to compose a letter of application, including content, correct grammar and vocabulary, spelling, and punctuation.*
4. *Fill out an application for employment as a welder.*
   a. *Performance Activity - Demonstrate the ability to fill out an application correctly and legibly using personal information requested.*
   b. *Performance Activity - Document qualifications and present identification.*

Suggested References:

Crockett, C., Stevens, S., & Stewart, B. Core Employment Skills. Columbia, MO: Instructional Materials Laboratory. 1990.

SECTION III:

RECOMMENDED TOOLS AND EQUIPMENT

RECOMMENDED TOOLS AND EQUIPMENT FOR WELDING (SECONDARY)

(Quantities for a class of 20 students)

1. Bench, work or steel topped layout (2)
2. Brush, carbon steel wire (20)
3. Brush, stainless steel wire (5)
4. Cabinet, eye safety, sanitizing w/20 safety glasses (1)
5. Chisel set, cold (2)
6. Clamps, C 8" (4)
7. Cleaners, oxyfuel tip (12)
8. Compressed air supply and accessories (min. 80 psi @ 8 cfm/station) (1)
9. Crane (A-frame) or cart (1)
10. Cutter, air carbon arc (CAC-A) (1)
11. Cutter, plasma arc (PAC) (1)
12. Dividers (radius maker, min. 6") (5)
13. Extinguisher, fire (3)
14. File, 10" mill, half round-bastard cut (5)
15. Flashlight (2)
16. Flints, oxyfuel friction (12)
17. Gas metal arc (GMAW) (spray and short circuit) (4)
18. Goggles, burning or face shield (OFC & PAC) (5)
19. Grinder, pedestal (2)
20. Grinder, 7"-9" right angle (2)
21. Grinder, 4"-5" right angle (4)
22. Hammer, chipping (20
23. Hammer, 16 oz. ball peen (3)
24. Helmet, welding (20)
25. Ironworker (1)
26. Jacket, cape, sleeves, or apron (leather) (5)
27. Kit, first aid (1)
28. Lighter, oxyfuel friction spark (12)
29. Oven, electrode (1)
30. Oxyfuel set, manual gas cutting (5)
31. Oxyfuel set, machine gas cutting (1)
32. Pliers, 10" groove or slip joint (20)
33. Pliers, 6" side or diagonal cutting (5)
34. Pliers, 10" vise grip clamp (5)
35. Pliers, 6" needle nosed (5)
36. Pliers, 10" vise grip (5)
37. Press, drill (1)
38. Press, hydraulic (1)
39. Punch, center (5)

40. Rule, 12" English/metric steel bench (10)
41. Saw, band (1)
42. Screwdriver set, Phillips head (3)
43. Screwdriver set, flathead (3)
44. Scribe, metal (5)
45. Shear, 1/4" capacity (1)
46. Square, combination set (5)
47. Station, eye wash (1)
48. Table, oxyfuel burning w/dross pan and replaceable slats (4'x8'x31") (2)
49. Table, oxyfuel welding, double-sided (2)
50. Tape, 10' steel measure (10)
51. Ventilation system (1)
52. Vise, bench, medium duty (4)
53. Welder, shielded metal arc (SMAW) (10)
54. Welder, gas tungsten arc (GTAW) (1)
55. Wrench set, combination (1)
56. Wrench set, Allen or hex to 3/8" (5)
57. Wrench, 12" adjustable (3)

RECOMMENDED INSTRUCTIONAL AIDS

1. Calculator (1)
2. Cart, AV (for overhead projector) (1)
3. Cart, AV (for TV-VCR) (1)
4. Projector, overhead (1)
5. TV-VCR (1)
6. Video out (Microcomputer to TV monitor) (1)

APPENDIX A:

RELATED ACADEMIC TOPICS

APPENDIX A

RELATED ACADEMIC TOPICS FOR COMMUNICATIONS

C1 Interpret written material.
C2 Interpret visual materials (maps, charts, graphs, tables, etc.).
C3 Listen, comprehend, and take appropriate actions.
C4 Access, organize, and evaluate information.
C5 Use written and/or oral language skills to work cooperatively to solve problems, make decisions, take actions, and reach agreement.
C6 Communicate ideas and information effectively using various oral and written forms for a variety of audiences and purposes.

EXPANDED TOPICS FOR COMMUNICATIONS

TOPIC C1: Interpret written material.

C1.01 Read and follow complex written directions.
C1.02 Recognize common words and meanings associated with a variety of occupations.
C1.03 Adjust reading strategy to purpose and type of reading.
C1.04 Use sections of books and reference sources to obtain information.
C1.05 Compare information from multiple sources and check validity.
C1.06 Interpret items and abbreviations used in multiple forms.
C1.07 Interpret short notes, memos, and letters.
C1.08 Comprehend technical words and concepts.
C1.09 Use various reading techniques depending on purpose for reading.
C1.10 Find, read, understand, and use information from printed matter or electronic sources.

TOPIC C2: Interpret visual materials (maps, charts, graphs, tables, etc.).

C2.01 Use visuals in written and in oral presentations.
C2.02 Recognize visual cues to meaning (layout, typography, etc.).
C2.03 Interpret and apply information using visual materials.

TOPIC C3: Listen, comprehend, and take appropriate action.

C3.01 Identify and evaluate orally-presented messages according to purpose.
C3.02 Recognize barriers to effective listening.
C3.03 Recognize how voice inflection changes meaning.
C3.04 Identify speaker signals requiring a response and respond accordingly.
C3.05 Listen attentively and take accurate notes.
C3.06 Use telephone to receive information.

C3.07 Analyze and distinguish information from formal and informal oral presentations.

TOPIC C4: Access, organize, and evaluate information.

C4.01 Distinguish fact from opinion.
C4.02 Use various print and non-print sources for specialized information.
C4.03 Interpret and distinguish between literal and figurative meaning.
C4.04 Interpret written or oral communication in relation to context and writer's point of view.
C4.05 Use relevant sources to gather information for written or oral communication.

TOPIC C5: Use written and/or oral language skills to work cooperatively to solve problems, make decisions, take actions, and reach agreement.

C5.01 Select appropriate words for communication needs.
C5.02 Use reading, writing, listening, and speaking skills to solve problems.
C5.03 Compose inquiries and requests.
C5.04 Write persuasive letters and memos.
C5.05 Edit written reports, letters, memos, and short notes for clarity, correct grammar, and effective sentences.
C5.06 Write logical and understandable statements, phrases, or sentences for filling out forms, for correspondence or reports.
C5.07 Write directions or summaries of processes, mechanisms, events, or concepts.
C5.08 Select and use appropriate formats for presenting reports.
C5.09 Convey information to audiences in writing.
C5.10 Compose technical reports and correspondence that meet accepted standards for written communications.

TOPIC C6: Communicate ideas and information using oral and written forms for a variety of audiences and purposes.

C6.01 Give complex oral instructions.
C6.02 Describe a business or industrial process/mechanism.
C6.03 Participate effectively in group discussions and decision making.
C6.04 Produce effective oral messages utilizing different media.
C6.05 Explore ideas orally with partners.
C6.06 Participate in conversations by volunteering information when appropriate and asking relevant questions when appropriate.
C6.07 Restate or paraphrase a conversation to confirm one's own understanding.
C6.08 Gather and provide information utilizing different media.

C6.09 Prepare and deliver persuasive, descriptive, and demonstrative oral presentations.

RELATED ACADEMIC TOPICS FOR MATHEMATICS

M1 Relate number relationships, number systems, and number theory.
M2 Explore patterns and functions.
M3 Explore algebraic concepts and processes.
M4 Explore the concepts of measurement.
M5 Explore the geometry of one-, two-, and three-dimensions.
M6 Explore concepts of statistics and probability in real world situations.
M7 Apply mathematical methods, concepts, and properties to solve a variety of real-world problems.

EXPANDED TOPICS FOR MATHEMATICS

TOPIC M1: Relate number relationships, number systems, and number theory.

M1.01 Understand, represent, and use numbers in a variety of equivalent forms (integer, fraction, decimal, percent, exponential, and scientific notation) in real world and mathematical problem situations.
M1.02 Develop number sense for whole numbers, fractions, decimals, integers, and rational numbers.
M1.03 Understand and apply ratios, proportions, and percents in a wide variety of situations.
M1.04 Investigate relationships among fractions, decimals, and percents.
M1.05 Compute with whole numbers, fractions, decimals, integers, and rational numbers.
M1.06 Develop, analyze, and explain procedures for computation and techniques for estimations.
M1.07 Select and use an appropriate method for computing from among mental arithmetic, paper-and-pencil, calculator, and computer methods.
M1.08 Use computation, estimation, and proportions to solve problems.
M1.09 Use estimation to check the reasonableness of results.

TOPIC M2: Explore patterns and functions.

M2.01 Describe, extend, analyze, and create a wide variety of patterns.
M2.02 Describe and represent relationships with tables, graphs, and rules.
M2.03 Analyze functional relationships to explain how a change in one quantity results in a change in another.
M2.04 Use patterns and functions to represent and solve problems.
M2.05 Explore problems and describe results using graphical, numerical, physical, algebraic, and verbal mathematical models or representations.

M2.06 Use a mathematical idea to further their understanding of other mathematical ideas.
M2.07 Apply mathematical thinking and modeling to solve problems that arise in other disciplines, such as art, music, and business.

TOPIC M3: Explore algebraic concepts and processes.

M3.01 Represent situations and explore the interrelationships of number patterns with tables, graphs, verbal rules, and equations.
M3.02 Analyze tables and graphs to identify properties and relationships and to interpret expressions and equations.
M3.03 Apply algebraic methods to solve a variety of real world and mathematical problems.

TOPIC M4: Explore the concepts of measurement.

M4.01 Estimate, make, and use measurements to describe and compare phenomena.
M4.02 Select appropriate units and tools to measure to the degree of accuracy required in a particular situation.
M4.03 Extend understanding of the concepts of perimeter, area, volume, angle measure, capacity, and weight and mass.
M4.04 Understand and apply reasoning processes, with special attention to spatial reasoning and reasoning with proportions and graphs.

TOPIC M5: Explore the geometry of one-, two-, and three-dimensions.

M5.01 Identify, describe, compare, and classify geometric figures.
M5.02 Visualize and represent geometric figures with special attention to developing spatial sense.
M5.03 Explore transformations of geometric figures.
M5.04 Understand and apply geometric properties and relationships.
M5.05 Classify figures in terms of congruence and similarity and apply these relationships.

TOPIC M6: Explore the concepts of statistics and probability in real world situations.

M6.01 Systematically collect, organize, and describe data.
M6.02 Construct, read, and interpret tables, charts, and graphs.
M6.03 Develop an appreciation for statistical methods as powerful means for decision making.
M6.04 Make predictions that are based on exponential or theoretical probabilities.

M6.05 Develop an appreciation for the pervasive use of probability in the real world.

TOPIC M7: Apply mathematical methods, concepts, and properties to solve a variety of real-world problems.

M7.01 Use computers and/or calculators to process information for all mathematical situations.
M7.02 Use problem-solving approaches to investigate and understand mathematical content.
M7.03 Formulate problems from situations within and outside mathematics.
M7.04 Generalize solutions and strategies to new problem situations.

RELATED ACADEMIC TOPICS FOR SCIENCE

S1 Explain the Anatomy and Physiology of the human body.
S2 Apply the basic biological principles of Plants, Viruses and Monerans, Algae, Protista, and Fungi.
S3 Relate the nine major phyla of the kingdom animalia according to morphology, anatomy, and physiology.
S4 Explore the chemical and physical properties of the earth to include Geology, Meteorology, Oceanography, and the Hydrologic Cycle.
S5 Investigate the properties and reactions of matter to include symbols, formulas and nomenclature, chemical equations, gas laws, chemical bonding, acid-base reactions, equilibrium, oxidation-reduction, nuclear chemistry, and organic chemistry.
S6 Explore the principles and theories related to motion, mechanics, electricity, magnetism, light energy, thermal energy, wave energy, and nuclear physics.
S7 Explore the principles of genetic and molecular Biology to include the relationship between traits and patterns of inheritance, population genetics, the structure and function of DNA, and current applications of DNA technology.
S8 Apply concepts related to the scientific process and method to include safety procedures for classroom and laboratory; use and care of scientific equipment; interrelationships between science, technology and society; and effective communication of scientific results in oral, written, and graphic form.

EXPANDED TOPICS FOR SCIENCE

TOPIC S1: Explain the Anatomy and Physiology of the human body.

S1.01 Recognize common terminology and meanings.
S1.02 Explore the relationship of the cell to more complex systems within the body.

S1.03 Summarize the functional anatomy of all the major body systems.
S1.04 Relate the physiology of the major body systems to its corresponding anatomy.
S1.05 Compare and contrast disease transmission and treatment within each organ system.
S1.06 Explore the usage of medical technology as related to human organs and organ systems.
S1.07 Explain the chemical composition of body tissue.

TOPIC S2: Apply the basic biological principles of Plants, Viruses and Monerans, Algae, Protista, and Fungi.

S2.01 Identify the major types and structures of plants, viruses, monera, algae protista, and fungi.
S2.02 Explain sexual and asexual reproduction.
S2.03 Describe the ecological importance of plants as related to the environment.
S2.04 Analyze the physical chemical and behavioral process of a plant.

TOPIC S3: Relate the nine major phyla of the kingdom animalia according to morphology, anatomy, and physiology.

S3.01 Explain the morphology, anatomy, and physiology of animals.
S3.02 Describe the characteristics, behaviors, and habitats of selected animals.

TOPIC S4: Explore the chemical and physical properties of the earth to include Geology, Meteorology, Oceanography, and the Hydrologic Cycle.

S4.01 Examine minerals and their identification, products of the rock cycle, byproducts of weathering, and the effects of erosion.
S4.02 Relate the Hydrologic Cycle to include groundwater its zones, movement, and composition; surface water systems, deposits, and runoff.
S4.03 Consider the effects of weather and climate on the environment.
S4.04 Examine the composition of seawater; wave, tides, and currents; organisms, environment, and production of food; energy, food and mineral resources of the oceans.

TOPIC S5: Investigate the properties and reactions of matter to include symbols, formulas and nomenclature, chemical equations, gas laws, chemical bonding, acid-base reactions, equilibrium, oxidation-reduction, nuclear chemistry, and organic chemistry.

S5.01 Examine the science of chemistry to include the nature of matter, symbols, formulas and nomenclature, and chemical equations.

S5.02 Identify chemical reactions including precipitation, acids-bases, and reduction-oxidation.
S5.03 Explore the fundamentals of chemical bonding and principles of equilibrium.
S5.04 Relate the behavior of gases.
S5.05 Investigate the structure, reactions, and uses of organic compounds; and investigate nuclear chemistry and radiochemistry.

TOPIC S6: Explore the principles and theories related to motion, mechanics, electricity, magnetism, light energy, thermal energy, wave energy, and nuclear physics.

S6.01 Examine fundamentals of motion of physical bodies and physical dynamics.
S6.02 Explore the concepts and relationships among work, power, and energy.
S6.03 Explore principles, characteristics, and properties of electricity, magnetism, light energy, thermal energy, and wave energy.
S6.04 Identify principles of modern physics related to nuclear physics.

TOPIC S7: Explore the principles of genetic and molecular Biology to include the relationship between traits and patterns of inheritance; population genetics, the structure and function of DNA, and current applications of DNA technology.

S7.01 Examine principles, techniques, and patterns of traits and inheritance in organisms.
S7.02 Apply the concept of population genetics to both microbial and multicellular organism.
S7.03 Identify the structure and function of DNA and the uses of DNA technology in science, industry, and society.

TOPIC S8: Apply concepts related to the scientific process and method to include safety procedures for classroom and laboratory; use and care of scientific equipment; interrelationships between science, technology and society; and effective communication of scientific results in oral, written, and graphic form.

S8.01 Apply the components of scientific processes and methods in classroom and laboratory investigations.
S8.02 Observe and practice safe procedures in the classroom and laboratory.
S8.03 Demonstrate proper use and care for scientific equipment.
S8.04 Investigate science careers, and advances in technology.
S8.05 Communicate results of scientific investigations in oral, written, and graphic form.

APPENDIX B:

WORKPLACE SKILLS

APPENDIX B
WORKPLACE SKILLS FOR THE 21ST CENTURY

WP1 Allocates resources (time, money, materials and facilities, and human resources).

WP2 Acquires, evaluates, organizes and maintains, and interprets/communicates information, including the use of computers.

WP3 Practices interpersonal skills related to careers including team member participation, teaching other people, serving clients/customers, exercising leadership, negotiation, and working with culturally diverse.

WP4 Applies systems concept including basic understanding, monitoring and correction system performance, and designing and improving systems.

WP5 Selects, applies, and maintains/troubleshoots technology.

WP6 Employs thinking skills including creative thinking, decision making, problem solving, reasoning, and knowing how to learn.

APPENDIX C:

STUDENT COMPETENCY PROFILE

STUDENT COMPETENCY PROFILE FOR WELDING I

Student: _____

This record is intended to serve as a method of noting student achievement of the competencies in each course. It can be duplicated for each student and serve as a cumulative record of competencies achieved in the program.

In the blank before each competency, place the date on which the student mastered the competency.

UNIT 1: Occupational Orientation and Safety

_____ 1. Explain vocational policies, procedures, and requirements.
_____ 2. Apply safety laws and standards used in welding.
_____ 3. Identify organizations associated with welding.
_____ 4. Describe requirements for a successful welder.

UNIT 2: Drawing and Welding Symbol Interpretation

_____ 1. Interpret basic elements of a drawing or sketch.
_____ 2. Identify sources of welding symbol information.

UNIT 3: Oxyfuel Gas Cutting and Welding

_____ 1. Perform safety inspections of equipment and accessories.
_____ 2. Demonstrate procedures for cutting mild steel with oxyacetylene cutting equipment.
_____ 3. Demonstrate procedures for welding mild steel with oxyacetylene welding equipment.

UNIT 4: Shielded Metal Arc Welding (SMAW)

_____ 1. Perform safety inspections of equipment and accessories.
_____ 2. Identify types of welding machines and their accessories.
_____ 3. Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.

STUDENT COMPETENCY PROFILE
FOR WELDING II

Student: _____

This record is intended to serve as a method of noting student achievement of the competencies in each course. It can be duplicated for each student and serve as a cumulative record of competencies achieved in the program.

In the blank before each competency, place the date on which the student mastered the competency.

UNIT 1: Occupational Orientation and Safety Review

_____ 1. Explain vocational policies, procedures and requirements.
_____ 2. Apply safety laws and standards used in welding.
_____ 3. Identify organizations associated with welding.
_____ 4. Describe requirements for a successful welder.

UNIT 2: Shielded Metal Arc Welding (SMAW) (Continued)

_____ 1. Perform safety inspections of equipment and accessories.
_____ 2. Identify types of welding machines and their accessories.
_____ 3. Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.

UNIT 3: Gas Metal Arc Welding (GMAW) Short Arc

_____ 1. Perform safety inspections of equipment and accessories.
_____ 2. Identify types of welding machines and their accessories.
_____ 3. Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.

UNIT 4: Gas Tungsten Arc Welding (GTAW)

_____ 1. Perform safety inspections of equipment and accessories.
_____ 2. Identify types of welding machines and their accessories.
_____ 3. Demonstrate the ability to set up and perform welding operations on mild steel, according to established safety procedures.

UNIT 5: Arc Cutting Principles and Practices

_____ 1. Explain the principles of air carbon arc cutting (CAC-A).
_____ 2. Perform Plasma Arc Cutting (PAC).

UNIT 6: Drawing and Welding Symbol Interpretation (Continued)

_____ 1. Interpret basic elements of a drawing or sketch.

UNIT 7: Job Seeking Skills

_____ 1. Describe ways to arrange a job interview.
_____ 2. Describe what employers look for and why job applicants need to be well prepared.
_____ 3. Prepare an effective resume/personal data sheet and letter of application.
_____ 4. Fill out an application for employment as a welder.